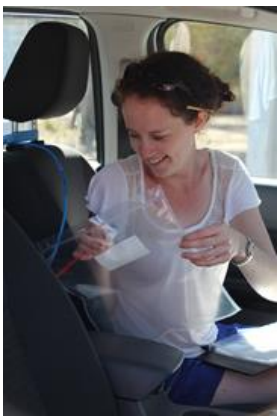
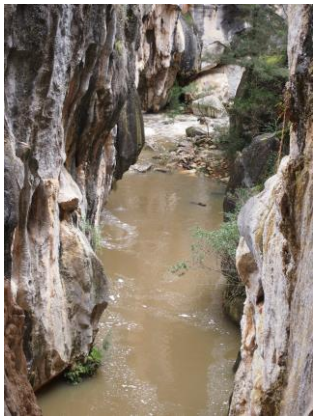
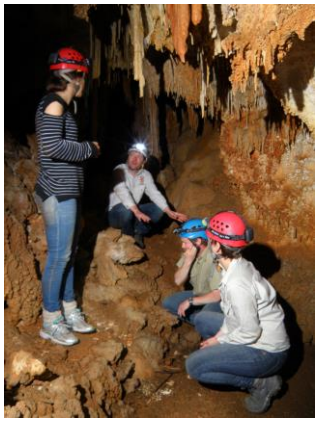
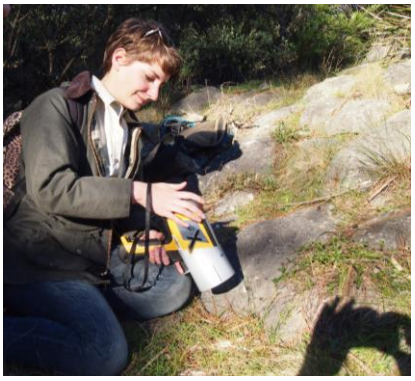
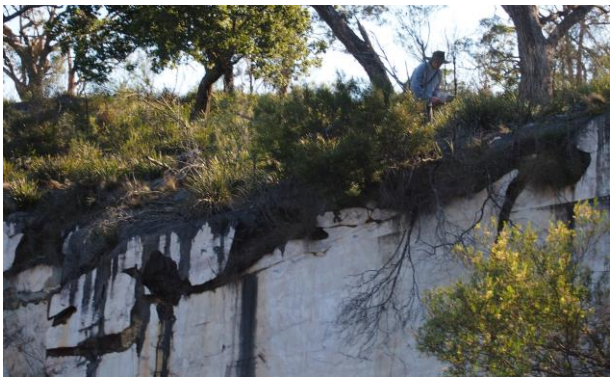
FACULTY OF SCIENCE

SCHOOL OF BIOLOGICAL, EARTH AND ENVIRONMENTAL SCIENCES

GEOS3733 / GEOS6733

ENVIRONMENTAL GEOPHYSICS

SESSION 2 2018

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1. Staff Contact Details

Position	Name	Email	Availability; times and location
Course Convener	Prof. Andy Baker	a.baker@unsw.edu.au	E26 room 5114. Please send an e-mail to arrange a consultation time
Lecturer	A/Prof Bryce Kelly	Bryce.kelly@unsw.edu.au	E26 room 5115. Please send an e-mail to arrange a consultation time
Lecturer	Dr. Helen Rutlidge	h.rutlidge@unsw.edu.au	E26, 5th floor East workspace and Water Research Laboratory, Manly Vale. Please send an e-mail to arrange a consultation time

2. Course details

Credit Points:
6 units

There are no prerequisites for this course.

Note: there is no difference between GEOS3733 and GEOS6733. GEOS3733 is for undergraduate entry and GEOS6733 is for postgraduate entry.

Summary of the Course
This 6 unit of credit course is run as a 5-day fieldclass, during O-week of Semester 2. In 2018 we will be based at Wombeyan Karst Conservation Reserve, NSW.

Each day, you will be given short lectures on the theory behind various environmental geophysical methods used in the analysis of air, water, soil, vegetation or the subsurface. This will be followed by field measurements to enable everyone to get hands-on experience of geophysical techniques.

This course aims to provide skills required in research and consulting environments in hydrology, hydrogeology, climatology and environment sciences.
Methods covered will include a selection of the following environmental geophysical techniques, depending on instrument availability:
- weather station design and hydrology measurements using geophysical techniques; acoustic drip loggers; environmental geophysics of caves
- infra-red measurements of soil and atmospheric carbon dioxide concentrations
- x-ray fluorescence analysis of soil mineral properties

- optical geophysics, using fluorescence and absorbance, to measure river organic matter water quality
- cavity-ringdown and off-axis mass spectrometry measurements for mapping methane and carbon dioxide processes in the landscape

Aims of the Course

This course aims to provide each student with the necessary theory and skills to undertake geophysical measurements of air, water, vegetation, soil and rock. These skills are often required in research and consulting environments in hydrology, hydrogeology, climatology and environment sciences.

Students will gain a theoretical understanding of the electromagnetic, optical, and dynamic properties of air, water, vegetation, soil and rock; practical field experience in measuring the properties of air, water, vegetation soil and rock; data analysis skills; group work experience; public presentation skills; and literature research skills.

Student learning outcomes

At the end of this course, you should know how to apply a range of geophysical methods for a range of environmental applications.

These could include the following:

- Understand the theory and application of using time domain reflectometry (TDR) to measure soil moisture.
- Understand the theory and application of optical spectroscopic measurements to determine river and groundwater quality.
- Understand the theory and application of X-ray fluorescence to analyse soil and rock mineralogical properties
- Understand the theory and application of infra-red measurements of gas carbon dioxide concentration and fluxes
- Understand the theory and application of acoustic and measurements of hydrology and pressure transducer measurements of water level and application to investigations of water balance
- Understand the theory and application of cavity-ringdown mass spectrometry and its application to gas analyses such as methane and carbon dioxide.

Graduate Attributes

The students will be encouraged to develop the following Graduate Attributes by undertaking the selected activities and knowledge content. These attributes will be assessed within the prescribed assessment tasks.

At the conclusion of this course the student will be able to:

1. Understand the theory behind a wide range of field environmental geophysical techniques
2. Apply these theories to the field application of the techniques
3. Undertake analysis of the field data
4. Create reports and presentations based on the theory and application of the techniques.

3. Rationale for the inclusion of content and teaching approach

This course content enables students to develop specific skills in the theory and application of environmental geophysical techniques. Students will develop report writing and presentation skills. theoretical, application and communications skills. These skills are often required in research and consulting environments in hydrology, hydrogeology, climatology and environment sciences.

4. Teaching strategies

This course is taught as a 5-day field course, as we believe that the best way to reinforce theory and to make the theories relevant to you, is for you to have hands on experience with each technique. Each technique will be introduced with a lecture, which covers the theory of each methodology, followed by up to a whole day applying the method in the field.

Day one is travelling to the field trip, and in the afternoon we will give you a tour of the field site.

The course will be taught in small groups. On days two to four, each group will rotate between the different geophysical techniques, and on each day the fieldwork will build on the results of the previous day.

On day five, each group will give a presentation that summarizes their work on days two, three and four. This enables all the groups to see how each project evolved over the fieldtrip, and enables everyone to synthesize the results of the fieldtrip. We invite local managers, staff and stakeholders to this meeting. In 2018 this is likely to be the manager of Wombeyan Karst Reserve, local National Parks and Wildlife Service staff, and show-cave guides. Student groups exchange datasets, so that everyone has a complete set of data from the fieldclass.

After the fieldclass, an individual field report is submitted by the end of week 7. This field report summarizes the findings of the fieldtrip, based on each geophysical technique or project. We recommend that you complete this assignment well before week 7, when there are fewer coursework deadlines, as you can complete this assignment at any time after the fieldclass.

The final assessment is a literature review of one of the geophysical techniques taught on this course. You have a free choice of the technique that you cover in the review.

5. Assessment

Assessment task	Length	Weight	Learning outcomes assessed	Graduate attributes assessed	Due date
Field group presentation	15 minutes + questions	20%	Theoretical understanding, field application, data processing	Presentation skills	Held on fieldtrip
Field report	500 words, 2 figures and 1 table maximum per technique	40%	Field application, data processing	Data analysis and report writing	Week 7
Literature review of one technique	Maximum 2500 words	40%	Knowledge collation	Scientific synthesis and clarity of expression	Week 10

The details of the assessment tasks will be provided at the start of the field course. Please submit your assignments to the BEES School Office.

Assignments and reports must be submitted on time. No extensions will be permitted (apart from the normal provisions in the University calendar). Completed laboratory exercises and assignments **with cover sheet** must be submitted at the correct time as stated for the assignment. **Penalties for late submission – 10% per day up to 5 days, then mark is 0%**

6. Academic honesty and plagiarism

What is Plagiarism?

Plagiarism is the presentation of the thoughts or work of another as one's own.
*Examples include:

- direct duplication of the thoughts or work of another, including by copying material, ideas or concepts from a book, article, report or other written document (whether published or unpublished), composition, artwork, design, drawing, circuitry, computer program or software, web site, Internet, other electronic resource, or another person's assignment without appropriate acknowledgement;
- paraphrasing another person's work with very minor changes keeping the meaning, form and/or progression of ideas of the original;
- piecing together sections of the work of others into a new whole;
- presenting an assessment item as independent work when it has been produced in whole or part in collusion with other people, for example, another student or a tutor; and
- claiming credit for a proportion a work contributed to a group assessment item that is greater than that actually contributed.†

For the purposes of this policy, submitting an assessment item that has already been submitted for academic credit elsewhere may be considered plagiarism.

Knowingly permitting your work to be copied by another student may also be considered to be plagiarism.

Note that an assessment item produced in oral, not written, form, or involving live presentation, may similarly contain plagiarised material.

The inclusion of the thoughts or work of another with attribution appropriate to the academic discipline does *not* amount to plagiarism.

The Learning Centre website is main repository for resources for staff and students on plagiarism and academic honesty. These resources can be located via:

www.lc.unsw.edu.au/plagiarism

The Learning Centre also provides substantial educational written materials, workshops, and tutorials to aid students, for example, in:

- correct referencing practices;
- paraphrasing, summarising, essay writing, and time management;
- appropriate use of, and attribution for, a range of materials including text, images, formulae and concepts.

Individual assistance is available on request from The Learning Centre.

Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting, and the proper referencing of sources in preparing all assessment items.

* Based on that proposed to the University of Newcastle by the St James Ethics Centre. Used with kind permission from the University of Newcastle

† Adapted with kind permission from the University of Melbourne

7. Course schedule

Environmental Geophysics runs in O-week, from Monday 16th to Friday 20th July 2018 at Wombeyan Karst Reserve, NSW.

For information see:
http://www.nationalparks.nsw.gov.au/visit-a-park/parks/wombeyan-karst-conservation-reserve

The cost for the fieldtrip is $44 per person. This covers accommodation costs. You must pay for the trip beforehand. We will post instructions on how to do this at the Moodle site when it is up and running. Accommodation is on site, in dormitory-style accommodation.

Please bring warm clothes and walking boots - we will be outside all day irrespective of the weather, and you can expect frost, and sometimes snow.

Food will be self-catering. You will need to bring your own plates, bowls, cutlery and mugs, as well as food and beverages for dinner (Monday-Thursday), lunches (Tuesday-Thursday) and breakfasts (Tuesday-Friday). There is a large 'camp kitchen facility with cookers, fridges and microwaves. We recommend you bring easy to prepare/cook meals, to prevent a crush on cooking facilities. Large supermarkets on-route are at Goulburn or Mittagong. We will set up a discussion group about cooking option and ideas for small-group cooking.

Wombeyan Caves are situated between Taralga and Mittagong. There is no mobile coverage by any service provider. There is no wireless or internet of any kind. This is one public pay phone on site. There are no shops within one-hour drive. Limited provisions are stocked in the NPWS office/kiosk.

All participants are required to make their own way to and from the field class. Driving is the only option, and it about 3 hours driving time from Sydney to the field site. We will set up a discussion group on Moodle for car sharing. We recommend drivers leave Sydney either before or after the morning rush hour, which will give plenty if time for the journey with driver breaks and a chance to enjoy the drive. The standard route is Sydney – Goulburn – Taralga – Wombeyan. Experienced drivers with 4WD can opt for the Sydney – Mittagong – Wombeyan route (https://en.wikipedia.org/wiki/Wombeyan_Caves_Road). Note that there is no petrol after Taralga or Mittagong, and the Wombeyan Caves Road and be closed by floods.

Before the field class

Pay the course fees. Organise your transport and plan what food and beverages you will buy. Download any resources you need from the Moodle site, as there is no wireless access on the field trip.

Monday 16th July:

- 2 pm Introduction to the course and tour of the site.

Tuesday - Thursday:

- 9:00 am to 6:00 pm Lectures, fieldwork and data analysis

Friday 20th July:

- 9am Group presentations

- 11am Fieldtrip summary and departures

8. Expected Resources for students

There is no single textbook for this course. However, the following books are relevant to specific techniques:

Coble, P.G. et al. (eds) 2014. Aquatic Organic Matter Fluorescence. CUP. 978-11-398-97907. (Due Apr 2014)
Flanagan, L.B. et al. 2005. Stable isotopes and biosphere - atmosphere interactions: processes and biological controls. Elsevier Academic ISBN 978-012-0884-476
Kirkham, M.B., 2014. Principles of Soil and Plant Water Relations. Elsevier Academic Press. 2nd Ed ISBN 978-012-4200-227 (Due June 2014)
Price, M. 2013. Introducing Groundwater. Springer. 2nd Edn. ISBN 978-041-2485-008
West, J.B. et al (eds) 2010. Isoscapes. Springer 978-90-481-3354-3.

All lectures will be uploaded onto Moodle and handouts will be made available where appropriate during the field class. Lecture notes and handouts will provide details of additional reading material, available from the UNSW Library website:
http://info.library.unsw.edu.au/web/services/services.html

Some potentially useful internet resources that relate to the equipment available to the course are:
http://www.ictinternational.com/sfm1.html
http://www.picarro.com/products_solutions/isotope_analyzers/13c_for_ch4
http://www.soilmoisture.com/prod_details.asp?prod_id=895&cat_id=19

http://www.horiba.com/scientific/products/fluorescence-spectroscopy/steady-state/aqualog/aqualog-r-our-compact-benchtop-fluorometer-for-cdom-13031/
http://www.campbellsci.com.au/grws100

9. Course evaluation and development

This is the sixth time that this course has been run, and we will collect student feedback to continue to evaluate and develop the course. Based on previous feedback, we have extended the course by one day to provide more time to undertake the fieldwork, and we have provided more information about the assessment strategies. In 2018 we will also continue post-fieldtrip optional tutorials for the second time for anyone needing help with the field report or literature review. The course has also moved from week 1 to O-week on the request of other schools, to prevent timetable clashes.

10. Other information

Expectations of Students	Attendance on the fieldclass is compulsory.
Assignment Submissions **PENALTIES**	Assignments and reports must be submitted on time. No extensions will be permitted (apart from the normal provisions in the University calendar). Completed laboratory exercises and assignments **with cover sheet** must be submitted at the correct time as stated for the assignment. **Penalties for late submission – 10% per day up to 5 days, then mark is 0%**
Assessment Procedures	Normal UNSW rules apply to illness, misadventure or other situations which affect attendance at class or submission of assessment tasks.
Equity and Diversity	Students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss study needs with the course Coordinator prior to the course commencing, or with the Equity Officer (Disability) in the Equity and Diversity Unit (9385 4734 or www.equity.unsw.edu.au/disabil.html). Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made. Information on designing courses and course outlines that take into account the needs of students with disabilities can be found at: www.secretariat.unsw.edu.au/acboardcom/minutes/coe/disabilityguidelines.pdf

Grievance Policy[1]	**School Contact**	**Faculty Contact**	**University Contact**
	Dr Jes Sammut School of BEES Tel: 9385 8281	A/Prof Julian Cox Associate Dean (Education) julian.cox@unsw.edu.au Tel: 9385 8574 or Dr Gavin Edwards Associate Dean (Undergraduate Programs) g.edwards@unsw.edu.au Tel: 9385 4652	Compass University Counselling Services[2] Tel: 9385 5418

[1] UNSW Grievance Policy: http://www.infonet.unsw.edu.au/poldoc/student_grievance_resolution.pdf
[2] Compass – University Counselling Service http://www.counselling.unsw.edu.au/compass_programs/